APPENDIX B

Precipitation Gauge Investigation

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PRECIPITATION GAUGE INVESTIGATION

1. SUMMARY

A malfunction in the tipping-bucket precipitation gauge at Site 1 was identified on October 12, 2008 during the calibration verification test. Review of the data did not indicate when the malfunction occurred, so the quality of data collected since the previous calibration on March 27, 2008, is uncertain, and therefore is unusable. The data affected is the months from April through October 2008.

Data from four manually measured precipitation gauges associated with the EFR surface water network were compared to results from the recording gauge at Site 1. For the three months of data available for both the recording gauge and the manual gauges, November 2008 and May/June 2009, the results from Site 1 and the surface water network showed only a small difference in monthly totals. Based on the good agreement of the data during the overlapping months, the monthly totals from the manually sampled EFR Surface Water sites are used in conjunction with the Site 1 precipitation data to complete the annual reporting period.

2. MONITORING REQUIREMENTS

Colorado Department of Public Health and Environment licensing requirements applicable to the Site, RG 3.63, and environmental review guidance (NUREG-1478) state that the site precipitation data should be used to indicate if nearby long-term climate data are sufficiently representative of the site area to be used for designing the tailing impoundments. The NRC monitoring guidance specifies tabulating precipitation to be recorded daily and summarized as monthly totals.

The precipitation data are not used in atmospheric transport air quality modeling to estimate impacts of particulate matter nor gaseous materials emitted by the mill facility. The model used for this analysis, the Environmental Protection Agency (EPA) AERMOD model, utilizes precipitation frequency information provided by EPA in wet deposition and particulate matter control demonstrations.

3. MEASUREMENTS

The recording tipping-bucket precipitation gauge operating at Site 1 has an orifice diameter of eight inches. Precipitation water from rain or melted snow collects in a bucket mechanism which records each time the total reaches 0.01 inches of precipitation. The data recording system then records hourly totals for later processing to monthly totals. The accuracy of the precipitation measurement (Section 3a in RG 3.63) is ±10 percent for typical precipitation rates.

The gauges in the surface water network at the Site are a one-half inch diameter cylinder, about 5.5 inches long, mounted vertically to a post a few feet above the ground. The depth of water in the gauge is observed after a storm, and the gauge emptied. The small diameter orifice opening helps to reduce evaporation from the gauge prior to the observation. Four gauges were used for the surface water data record in this investigation.

4. RESULTS

Table B-1 shows the monthly total precipitation from the surface water manual gauges and the Site 1 tipping-bucket gauge for the period from May 2008 through June 2009. The column titled "Total EFR Precipitation" is the combination of surface water and Site 1 data to complete an annual record of precipitation for the Site. Data from Site 1 is used when available. For comparison between the two methods, the last row of Table B-1 has the three-month total (November 2008 and May/June 2009) for the surface water manual gauges and Site 1 data for the months with overlapping data.

The three-month totals for the surface water manual gauges and Site 1 data are 4.75 and 4.98 inches, respectively. The difference between the two values is -4.6 percent relative to the Site 1 value. Since the regulatory accuracy specification is ±10 percent, the surface water manual gauges data are considered usable for the purpose of characterizing annual total precipitation representative of conditions at the Site.

Table B-1
Precipitation Summary from EFR Monitoring

Months of Monitoring	Precipitation (Inches)		
	Surface Water Manual Gauges	Site 1	Total EFR [1]
May-08	0.61		0.61
Jun-08	0.45		0.45
Jul-08	0.20		0.20
Aug-08	0.84		0.84
Sep-08	1.08		1.08
Oct-08	1.16		1.16
Nov-08	1.00	1.19	1.19
Dec-08		2.62	2.62
Jan-09		0.46	0.46
Feb-09		0.32	0.32
Mar-09		0.61	0.61
Apr-09		0.47	0.47
May-09	2.15	1.91	---
Jun-09	1.60	1.88	---
Nov, May, Jun total	4.75	4.98	---

Notes
1. Only need 12 months of data for EFR precipitation.